



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,519	09/23/2003	Kenji Kawai	67161-107	2567
7590 11/01/2004				
McDermott, Will & Emery 600 13th Street, N.W. Washington, DC 20005-3096		EXAMINER LE, THAO X		
		ART UNIT PAPER NUMBER		
		2814		

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/667,519

Applicant(s)

KAWAI, KENJI

Examiner

Thao X Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 02/19/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

#### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 5-8, and 10-12 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6600183 to Visokay et al.

Regarding claim 12, Visokay discloses a semiconductor device in fig. 3 comprising: a semiconductor substrate 300, column 6 line 10, having a main surface; an interlayer insulation film 302, column 6 line 8, formed on said main surface of semiconductor substrate 300 and having a top surface and a hole (where 306-308 are located) reaching said semiconductor substrate; a conductive film 306/307/308/310 having a side surface (vertical portion of 310) and a top surface ranging from side surface and having a larger distance from main surface of semiconductor substrate 300 than a distance from the main surface of semiconductor substrate 300 to said top surface of said interlayer insulation film 302, fig. 3, said conductive film 306/307/308 filling hole; a bottom electrode 304, column 6 line 9, disposed in contact with

Art Unit: 2814

top and side surfaces of conductive film 310; a dielectric film 312, column 6 line 13, disposed on bottom electrode 304; and a top electrode 314, column 6 line 13, disposed on said dielectric film 312, fig. 3.

Regarding claims 2, 7, Visokay discloses the semiconductor device according to claim 1, wherein said conductive film 310, column 6 line 10, includes a barrier metal layer disposed in contact with said bottom electrode 304 and containing at least one selected from the group consisting of titanium, tantalum, titanium nitride, tantalum nitride, titanium-tungsten, tungsten nitride, tungsten-titanium nitride, zirconium nitride and titanium oxynitride, column 4 lines 52, and said bottom electrode 304 contains metal, column 4 line 35..

Regarding claims 3, 8, Visokay discloses the semiconductor device according to claim 1, wherein said conductive film includes a barrier metal layer 310/308 disposed in contact with said bottom electrode 304 and having a portion 308 formed to fill said hole.

Regarding claims 5, 10, Visokay discloses the semiconductor device according to claim 1, wherein said conductive film has a recess having an opening at said top surface of said Conductive film 310 and said bottom electrode 304 is formed to fill said recess.

Regarding claim 6, Visokay discloses a semiconductor device comprising: a semiconductor substrate 300 having a main surface; an interlayer insulation film 302 formed on said main surface of said semiconductor substrate 300 and having a top surface and a hole reaching said semiconductor substrate 300; a conductive film 308/310 having a top surface having a larger distance from said main surface of said semiconductor substrate 300 than a distance from the main surface of said semiconductor substrate 300 to said top surface of said interlayer insulation film 302, said conductive film 308 filling said hole, said conductive film 310

Art Unit: 2814

having a base (bottom portion of layer 310) formed on said top surface of said interlayer insulation film 302, and a sidewall (vertical portion) ranging from said base and extending away from said main surface of said semiconductor substrate 300; a bottom electrode 304 disposed on said interlayer insulation film 302 in contact with said base and said sidewall; a dielectric film 312 disposed on said bottom electrode 304; and a top electrode 314 disposed on said dielectric film 312, fig. 3.

Regarding claim 11, Visokay discloses a semiconductor device in fig. 3 comprising: a semiconductor substrate 300 having a main surface; an interlayer insulation 302 film disposed on said main surface of said semiconductor substrate 300 and having a top surface and first and second holes (where 306/307/308 are located) reaching said semiconductor substrate 300; first and second conductive films 308/310 filling said first and second holes, respectively; first and second bottom electrodes 304 extending away from said top surface of said interlayer insulation film 302, fig. 3, each having a portion with a top surface, and disposed in contact with said first and second conductive films 310, respectively; an insulator 316, column 5 line 59, disposed at said portion adjacent to the top surfaces of said first and second bottom electrodes and having one end connected to said first bottom electrode and the other end connected to said second bottom electrode, fig. 3 (the bottom electrode comprises 304/310/308); a dielectric film 312 disposed on said first and second bottom electrodes and; a top electrode 314 disposed on said dielectric film.

Regarding claim 12, Visokay discloses the semiconductor device according to claim 11, wherein said insulator 316 has a top surface and said top surface of said insulator 316 and said top surface of said first and second bottom electrodes are substantially in a single plane, fig. 3.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6600183 to Visokay in view of US 5763286 to Figura et al.

Regarding claim 4 and 9, Visokay does not disclose the semiconductor device wherein a portion of the conductive film 310 contacting said bottom electrode 304 has an uneven geometry.

However, Figura reference discloses in fig. 6 the semiconductor device wherein a portion of the conductive film 51, column 5 line 25, contacting said bottom electrode 61, column 5 line 5, has an uneven geometry. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use conductive uneven geometry the teaching of Figura with Visokay's device, because it would have increased the capacitance as taught by Figura, column 7 line 2.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

Art Unit: 2814

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le  
28 Oct. 2004

LONG PHAM  
PRIMARY EXAMINER